STORM WATER MANAGEMENT PLAN

FUEL STATION, CAR WASH, AND WAREHOUSE
BLACK GOLD

PRELIMINARY GRADING PLAN NO.: TPM 20974/ P05-036
COUNTY OF SAN DIEGO

Prepared by:
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Prepared for:
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9338 Bond Avenue,
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Date:
January 25, 2007

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

Storm Water Management Plan
For Priority Projects
(Major SWMP)

Project Name:	**BLACK GOLD**
Permit Number (Land Development Projects):	
Work Authorization Number (CIP):	
Applicant:	BLACK GOLD L.L.C
Applicant's Address:	9338 Bond Avenue, El Cajon, CA 92021
Plan Prepare By (*Leave blank if same as applicant*):	Hale Engineering 7910 Convoy Court, San Diego, CA 92111
Date:	August 22, 2006
Revision Date (If applicable):	

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9424) requires all applications for a permit or approval associated with a Land Disturbance Activity must be accompanied by a Storm Water Management Plan (SWMP) (section 67.804.f). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County.

Project Review Stage	Does the SWMP Need revisions?		If YES, Provide Revision Date
	YES	NO	

PROJECT DESCRIPTION

The project site is located on the northerly side of Old Highway 80, approximately one quarter mile east of the intersection of Old Highway 80 and Lake Jennings Road. The lot has been assigned assessors parcel number 395-250-21 and can be found on page 1232 G5 of the 2005 edition of the Thomas Guide to San Diego. The property has no physical address due to its previously undeveloped condition. The proposed project consists of

grading of the 3.9-acre lot, and the placement of private improvements. The grading and improvements serve to accommodate the construction of a 1300 square foot drive through car wash facility a commercial fueling station, a 16,500 square foot warehouse and associated office space occupying an area of 3900 square feet. An additional portion of the project site has been designated as the location for a 1400 square foot drive-through Starbucks coffee shop. Pursuant to Section 67.809 and Section C of Appendix A of the County of San Diego Storm Water Standards Manual, the proposed facility is classified as a High Priority Commercial Facility.

PRIORITY PROJECT DETERMINATION

Please check the box that best describes the project. Does the project meet one of the following criteria?

PRIORITY PROJECT	YES	NO
Redevelopment within the County Urban Area that creates or adds at least 5,000 net square feet of additional impervious surface area		
Residential development of more than 10 units		
Commercial developments with a land area for development of greater than 100,000 square feet	**X**	
Automotive repair shops		
Restaurants, where the land area for development is greater than 5.000 square feet		
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface		
Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition.		
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff		
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater		

STORMWATER QUALITY INFORMATION			
	QUESTIONS	**COMPLETED**	**NA**
1.	Describe the topography of the project area.	**X**	
2.	Describe the local land use within the project area and adjacent areas.	**X**	
3.	Evaluate the presence of dry weather flow.		**NA**
4.	Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., Construction, maintenance and operation).	**X**	
5.	For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	**X**	
6.	Determine if there are any High Risk Areas (municipal or Domestic water supply reservoirs or groundwater percolation facilities) within the project limits.		**NA**
7.	Determine the Regional Board special requirements, including TMDLs, effluent limits, etc.		**NA**
8.	Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.		**NA**
9.	If considering Treatment BMPs, determine the soil classification, Permeability, erodibility, and depth to groundwater.		**NA**
10.	Determine contaminated or hazardous soils within the project area.		**NA**

TOPOGRAPHY AND LAND USE

The project site is a previously undeveloped, vacant lot which is comprised mostly of natural scrub vegetation and small rock outcroppings. The topography of the site is best characterized as moderately sloping in the southwesterly direction. There is one natural valley traversing the site in a southwesterly direction as well. The properties to the east and west of the project site are both developed and are at a lower elevation. To the south of the project site lies the right of way for Old Highway 80. To the north of the site lies the right of way of Interstate 8. The area, at large, is best characterized as commercial/retail with both small and large commercial/retail uses existing in the immediate area.

HYDROLOGIC UNIT CONTRIBUTION

The project site is a part of the San Diego Hydrologic Unit, more specifically described as the Coches Hydrologic Sub-Area, Basin Number 907.14 within the Middle Coches Hydrologic Area. The proposed project will not significantly alter drainage patterns on the site. Driveways, access roads, and culverts will concentrate flows at certain locations, but will not significantly divert runoff from existing outlet points. The San Diego Hydrologic Unit has a contributing area of approximately 440 square miles. The project site has an area of approximately 3.9 acres or 0.0061 square mile. The percent area contribution of the project site is approximately 0.0014% of the total area of the hydrologic unit. All as defined by the California Regional Water Quality Board, Region 9, San Diego.

303(d) STATUS

The project site is a part of the San Diego Hydrologic Unit, more specifically described as the Coches Hydrologic Sub-Area, Basin Number 907.14 within the Middle San Diego Hydrologic Area. This hydrologic sub-area is not listed on the 2002 list as an impaired waterbody.

Checklist to determine if Treatment Best Management Practices (BMPs) are required for the project

No.	CRITERIA	YES	NO
1.	Is this an emergency project		**X**
2.	Have TMDLs been established for surface waters within the Project limit?		**X**
3.	Will the project directly discharge to a 303(d) impaired receiving water body?		**X**
4.	Is this project within the urban and environmentally sensitive areas as defined on the maps in Appendix B of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects*?	**X**	
5.	Consider approved Treatment BMPs for the project.	**X**	
6.	Project is not required to consider Treatment BMPs		**NA**
7.	End		

WATERSHED

Please check the watershed(s) for the project.

- ☐ San Juan
- ☐ Santa Margarita
- ☐ San Luis Rey
- ☐ Carlsbad
- ☐ San Dieguito
- ☐ Penasquitos
- ☒ San Diego
- ☐ Pueblo San Diego
- ☐ Sweetwater
- ☐ Otay
- ☐ Tijuana

Hydrologic sub-area and number(s)

Number	Name
907.14	Coches Hydrologic Sub-Area

WATER QUALITY ENVIRONMENT

BENEFICIAL USES

The Porter-Cologne Act establishes a comprehensive program for the protection of beneficial uses of the waters of the state. California Water Code Section 13050(f) describes the beneficial uses of surface and ground waters that may be designated by the State or Regional Board for protection as follows:

"Beneficial uses of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."

Beneficial uses for surface waters are designated under the Clean Water Act Section 303 in accordance with regulations contained in 40 CFR 131. The State is required to specify appropriate water uses to be achieved and protected. The beneficial use designation of surface waters of the state must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

In 1972, the State Board adopted a uniform list and description of beneficial uses to be applied throughout all basins of the State. During the 1994 Basin Plan update, beneficial use definitions were revised and some new beneficial uses were added. Overall, the following twenty-three beneficial uses are now defined statewide and are designated within the San Diego Region:

Municipal and Domestic Supply (MUN) - Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) - Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC) - Includes uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) - Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Ground Water Recharge (GWR) - Includes uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH) - Includes uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
Navigation (NAV) - Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
Hydropower Generation (POW) - Includes uses of water for hydropower generation.
Contact Water Recreation (REC-1) - Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
Non-Contact Water Recreation (REC-2) - Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Commercial and Sport Fishing (COMM) - Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
Aquaculture (AQUA) - Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.
Warm Freshwater Habitat (WARM) - Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
Cold Freshwater Habitat (COLD) - Includes uses of water that support cold-water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
Inland Saline Water Habitat (SAL) - Includes uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.
Estuarine Habitat (EST) - Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
Marine Habitat (MAR) - Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
Wildlife Habitat (WILD) - Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Preservation of Biological Habitats of Special Significance (BIOL) - Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

INLAND SURFACE WATERS AND GROUNDWATER

Water quality objectives must protect the most sensitive of the beneficial uses, which have been designated for a water body. Water quality objectives may be numerical values for water quality constituent or narrative descriptions. Water quality objectives must be based upon sound scientific water quality criteria needed to protect the most sensitive of the beneficial uses, which have been designated for a water body. Water quality objectives must be as stringent or more stringent than water quality criteria.

The RWQCB San Diego Basin Plan identifies several beneficial uses of receiving inland surface waters and ground waters. **Table 1** summarizes the beneficial uses identified for downstream inland surface waters and ground waters

Table 1 Summary of Inland Surface Waters and ground water resources.

Surface Waters	HU/ Basin Number	MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Inland Surface Waters																
Coches HSA	907.14	○		●					●	●		●	●	●		
Ground Waters																
Coches HSA	907.14	●	●	●	○											

● **Existing Beneficial Use**
○ **Potential Beneficial Use**
\+ **Exempt from Municipal Use**

POST CONSTRUCTION EXPECTED DISCHARGES

Potential pollutants that are anticipated to originate from this site or have the potential to originate from this site are listed in Attachment G-1 of the County of San Diego Storm Water Standards Manual. The following data is that which is deemed relevant to the project site. The proposed project is not expected to generate significant amounts of pollutants, but many constituents are generally anticipated for projects in this category.

An evaluation of the project's potential effect on water quality identifies several constituents of concern:

- litter and trash collecting in the drainage systems;
- oxygen-demanding substances including biodegradable organic material and chemicals;
- oils, grease, and other hydrocarbons emanating from paved areas on the site;
- organic compounds

POLLUTANTS OF CONCERN

Table 2 Anticipated and potential pollutants by project type (San Diego County, 2002)

✓ Anticipated Pollutants **P** Potential Pollutants	**General Pollutant Categories**								
Priority Project Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash and Debris	Oxygen-Demanding Substances	Oils and Grease	Bacteria and Viruses	Pesticides
Detached Residential	✓	✓			✓	✓	✓	✓	✓
Attached Residential	✓	✓			✓	**P**(1)	**P**(2)	**P**(1)	✓
Commercial (>100,000 S.F.)	**P**(1)	**P**(1)		**P**(2)	✓	**P**(5)	✓	**P**(3)	**P**(5)
Auto Repair Shops			✓	✓(4) (5)	✓		✓		
Restaurants					✓	✓	✓	✓	
Hillside Development (>5,000 S.F.)	✓	✓			✓	✓	✓		✓
Parking Lots	**P**(1)	**P**(1)	✓		✓	**P**(1)	✓		**P**(1)
Streets, Highways, and Freeways	✓	**P**(1)	✓	✓(4)	✓	**P**(5)	✓		

(1) A potential pollutant if landscaping exists on-site; (2) A potential pollutant if the project includes uncovered parking areas; (3) A potential pollutant if land use involved food or animal waste products; (4) Including petroleum hydrocarbons; (5) Including solvents.

Sediment

Sediments are soils or other surface materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

Nutrients

Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.

Trash and Debris
Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. In addition, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

Oxygen-Demanding Substances
This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

Oil and Grease
Oil and grease are characterized as high-molecular weight organic compounds. The primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

Bacteria and Viruses
Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

Pesticides
Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

Highly Commercial developments are generally expected to generate significant amounts of the pollutants that would aggravate downstream impairments. The primary pollutants of concern that might be generated by this development include: (1) oils and grease due to washing of automobiles (2) Heavy metals from fuels and leaks from automobiles (3) Organic Compounds resulting from washing of automobiles and cleaning compounds. Pollutants occurring during construction activities are a condition of concern. A complete program of construction Best Management Practices (BMPs) will be developed for the project site, and will be described in the project's Storm Water Pollution Prevention Program (SWPPP) for Construction Activities. The construction BMPs will address this condition of concern during the construction phase.

Soil Characteristics

Pursuant to the San Diego County Soils Interpretation Study, Soils Group Maps entitled El Cajon, sheet 55 and Alpine, sheet 56 the predominant soil group associated with the project site is Group C. Soil group 'C' is characterized by a high runoff potential.

Construction BMPs

The contractor will perform erosion control on the project site during all stages of construction using best management practices. Erosion control measures are designed to prevent transportation of silt into tributary waterways. Erosion control measures may include, but are not limited to the following:

Required:

- Scheduling
- Geotextiles and Mats
- Hydraulic Mulch
- Street Sweeping and Vacuuming
- Storm Drain Inlet Protection
- Material Use
- Solid Waste Management
- Stabilized Construction Entrance/Exit
- Straw Mulch
- Check Dam
- Earth Dikes/Drainage Swales & Ditches
- Silt Fence
- Material Delivery and Storage
- Spill Prevention and Control
- Concrete Waste Management
- Sanitary/Septic Waste Management
- Illicit Connection/Illegal Discharge Detection and Reporting
- Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

Additional:

- Gravel Bag Berm
- Contaminated Soil Management
- Hazardous Waste Management
- Liquid Waste Management

The above list of construction BMPs represents a likely course of action for the protection of the water quality environment associated with the project site. The BMP list may be modified, added to or subtracted from at the discretion of the contractor to facilitate the most effective performance of the plan based upon real world site conditions present at the time of construction. All BMPs shown are taken from the Caltrans Storm Water Quality Handbook.

Post-Construction BMPs
Pollutants of concern as discussed above will be addressed through three types of BMPs. These types of BMPs are site design, source control and treatment control.

Site Design BMPs
Site design BMPs aim to conserve natural areas and minimize impervious cover, especially impervious areas 'directly connected' to receiving waters, in order to maintain or reduce increases in peak flow velocities from the project site. The U.S. EPA (2002) has listed several site designs. BMPs that can be implemented development projects. The project has incorporated site design BMPs to the maximum extent possible.

	OPTIONS		YES	NO	N/A
1.	Can the project be relocated or realigned to avoid/reduce impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?				**X**
2.	Can the project be designed to minimize impervious footprint?		**X**		
3.	Conserve natural areas where feasible?		**X**		
4.	Where landscape is proposed, can rooftops, impervious sidewalks, walkways, trails and patios be drained into adjacent landscaping?		**X**		
5.	For roadway projects, can structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?				**X**
6.	Can any of the following methods be utilized to minimize erosion from slopes:				
	6.A.	Disturbing existing slopes only when necessary?	**X**		
	6.B.	Minimize cut and fill areas to reduce slope lengths?	**X**		
	6.C.	Incorporating retaining walls to reduce steepness of slopes or to shorten Slopes?	**X**		
	6.D.	Providing benches or terraces on high cut and fill slopes to reduce concentration of flows?	**X**		
	6.E.	Rounding and shaping slopes to reduce concentrated flow?	**X**		
	6.F.	Collecting concentrated flows in stabilized drains and channels?	**X**		

1. The Storm water runoff from the site does not impact any downstream receiving water body. There are no critical or problematic areas found on the project site.
5. The project is not a roadway project.

No.	CRITERIA	YES	NO	N/A
1.	Will the project increase velocity or volume of downstream flow?	**X**		
2.	Will the project discharge to unlined channels?		**X**	
3.	Will the project increase potential sediment load of downstream flow?		**X**	
4.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect upstream and/or downstream channel stability?		**X**	
5.	Review channel lining materials and design for stream bank erosion.			**X**
6.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.			**X**
7.	Include, where appropriate, energy dissipation devices at culverts.			**X**
8.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	**X**		
9.	Include, if appropriate, detention facilities to reduce peak discharges.	**X**		
10.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless predevelopment conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.			**X**
11.	Provide other design principles that are comparable and equally effective.	**X**		
12.	End			

The site design BMPs that will be incorporated into the design of this project include the following:

Site Layout – The layout of the site will be designed so as to minimize, to the maximum extent practicable, the use of impervious surfaces. This will be achieved by simplifying access routes and parking areas.

Landscape and Irrigation – All areas within the project site not requiring the use of impervious materials shall be landscaped so as to reduce velocity and subsequent siltation to a maximum. This includes all sloped areas with a grade in excess of 3:1 as well as any parking border areas and islands.

Fuel Island Canopy/Surface Grades – a canopy, which will prevent stormwater from falling directly onto fueling areas, shall protect all fuel island areas. In addition, the proposed surface improvements shall be designed to prevent surface stormwater from running across fueling areas.

Car Wash/Surface Grades – The car wash area shall be protected by a canopy, which will prevent stormwater from falling directly onto wash areas. In addition, the proposed surface improvements shall be designed to prevent surface stormwater from running across wash areas.

Underground Detention Basins – The project site shall utilize underground detention basins in order to mitigate for the increased runoff generated by the use of impervious surface onsite. This mitigation will ensure that the project site does not adversely impact downstream erosion, sedimentation or stream habitat.

Source Control BMPs

Source-control BMPs are activities, practices, and procedures (primarily non-structural) that are designed to prevent urban runoff pollution. These measures either reduce the amount of runoff from the site or prevent contact between potential pollutants and storm water. In addition, source-control BMPs are often the best method to address non-storm (dry-weather) flows.

No.	BMP		YES	NO	N/A
1.	**Provide Storm Drain System Stenciling and Signage**				
	1.a.	All storm drain inlets and catch basins within the project area shall have a stencil or tile placed with prohibitive language (such as: "NO DUMPING – DRAINS TO _____") and/or graphical icons to discourage illegal dumping.	**X**		
	1.b.	Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.	**X**		
2.	**Design Outdoors Material Storage Areas to Reduce Pollution Introduction**				
	2.a.	This is a detached single-family residential project. Therefore, personal storage areas are exempt from this requirement.			**X**
	2.b.	Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.	**X**		
	2.c.	The storage area shall be paved and sufficiently impervious to contain leaks and spills.	**X**		
	2.d.	The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.	**X**		

	BMP		YES	NO	N/A
3.	**Design Trash Storage Areas to Reduce Pollution Introduction**				
	3.a.	Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; or,	**X**		
	3.b.	Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.	**X**		
4.	**Use Efficient Irrigation Systems & Landscape Design**				
	The following methods to reduce excessive irrigation runoff shall be considered, and incorporated and implemented where determined applicable and feasible.				
	4.a.	Employing rain shutoff devices to prevent irrigation after precipitation.	**X**		
	4.b.	Designing irrigation systems to each landscape area's specific water requirements.	**X**		
	4.c.	Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.	**X**		
	4.d.	Employing other comparable, equally effective, methods to reduce irrigation water runoff.	**X**		
5.	**Private Roads**				**X**
	The design of private roadway drainage shall use at least one of the following				
	5.a.	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.			
	5.b.	Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter.			

	BMP		YES	NO	N/A
	5.c.	Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.			
	5.d.	Other methods that are comparable and equally effective within the project.			
6.	**Residential Driveways & Guest Parking**				**X**
	The design of driveways and private residential parking areas shall use one at least of the following features.				
	6.a.	Design driveways with shared access, flared (single lane at street) or wheelstrips (paving only under tires); or, drain into landscaping prior to discharging to the storm water conveyance system.			
	6.b.	Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the storm water conveyance system.			
	6.c.	Other features which are comparable and equally effective.			
7.	**Dock Areas**				
	Loading/unloading dock areas shall include the following.				
	7.a.	Cover loading dock areas, or design drainage to preclude urban run-on and runoff.	**X**		
	7.b.	Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.	**X**		
	7.c.	Other features which are comparable and equally effective.			

	BMP		YES	NO	N/A
8.	**Maintenance Bays**				**X**
	Maintenance bays shall include the following.				
	8.a.	Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.			
	8.b.	Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.			
	8.c.	Other features which are comparable and equally effective.			
9.	**Vehicle Wash Areas**				
	Priority projects that include areas for washing/steam cleaning of vehicles shall use the following.				
	9.a.	Self-contained; or covered with a roof or overhang.	**X**		
	9.b.	Equipped with a clarifier or other pretreatment facility.	**X**		
	9.c.	Properly connected to a sanitary sewer.	**X**		
	9.d.	Other features which are comparable and equally effective.			
10.	**Outdoor Processing Areas**				**X**
	Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, waste piles, and wastewater and solid waste treatment and disposal, and other operations determined to be a potential threat to water quality by the County shall adhere to the following requirements.				

	BMP		YES	NO	N/A
	10.a.	Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.			
	10.b.	Grade or berm area to prevent run-on from surrounding areas.			
	10.c.	Installation of storm drains in areas of equipment repair is prohibited.			
	10.d.	Other features which are comparable or equally effective.			
11.	**Equipment Wash Areas**				
	Outdoor equipment/accessory washing and steam cleaning activities shall be.				
	11.a.	Be self-contained; or covered with a roof or overhang.	**X**		
	11.b.	Be equipped with a clarifier, grease trap or other pretreatment facility, as appropriate	**X**		
	11.c.	Be properly connected to a sanitary sewer.	**X**		
	11.d.	Other features which are comparable or equally effective.			
12.	**Parking Areas**				
	The following design concepts shall be considered, and incorporated and implemented where determined applicable and feasible by the County.				
	12.a.	Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.		**X**	

	BMP		YES	NO	N/A
	12.b.	Overflow parking (parking stalls provided in excess of the County's minimum parking requirements) may be constructed with permeable paving.			**X**
	12.c.	Other design concepts that are comparable and equally effective.	**X**		
13.	**Fueling Area**				
	Non-retail fuel dispensing areas shall contain the following.				
	13.a.	Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.	**X**		
	13.b.	Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.	**X**		
	13.c.	Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff.	**X**		
	13.d.	At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.	**X**		

Source-control BMPs used on the project site are:

Material Storage – All storage of hazardous materials used in the day to day operation of the facility shall take place in designated areas, and shall be protected from the direct exposure to falling or flowing storm water. Hazardous liquid materials shall be given the same consideration as above, will be stored in containers deemed appropriate and will be protected by a secondary containment device.

Material Use – The use of hazardous materials onsite shall be minimized and the location of use shall be protected from the direct exposure to falling or flowing storm water. Attempts shall be made to use alternate products deemed less hazardous. All employees using such materials shall receive training in their proper use.

Spill Prevention and Control – All employees using the hazardous materials shall receive training in their proper use. The use of such materials shall be undertaken with the proper equipment. In the event that hazardous liquid materials are used or stored onsite they shall be kept in containers deemed appropriate and will be protected by a secondary containment device. All employees shall receive training regarding the proper course of action in the event of a spill and the proper disposal of the resultant materials. Spills shall not be washed into storm drains. In addition, measures shall be taken specifically to prevent spilled materials from entering storm drain.

Solid Waste Management – Waste products generated by the day to day operation of the facility shall be placed in a designated container and any hazardous waste shall be placed in a separate appropriate container and disposed of accordingly. All employees shall receive training regarding the location of waste and hazardous waste receptacles. The regular and timely disposal of waste materials and their transport off-site shall be arranged.

Landscape and Irrigation – All areas within the project site not requiring the use of impervious materials shall be landscaped so as to reduce velocity and subsequent siltation to a maximum. This includes all sloped areas with a grade in excess of 3:1 as well as any parking border areas and islands.

Fuel Island Canopy/Surface Grades – A canopy, which will prevent stormwater from falling directly onto fueling areas, shall protect all fuel island areas. In addition, the proposed surface improvements shall be designed to prevent surface stormwater from running across fueling areas.

Car Wash/Surface Grades – The car wash area shall be protected by a canopy, which will prevent stormwater from falling directly onto wash areas. In addition, the proposed surface improvements shall be designed to prevent surface stormwater from running across wash areas.

Vehicle & Equipment Wash Areas - Areas for washing/steam cleaning of vehicles and areas for outdoor equipment/accessory washing and steam cleaning shall be: (1) self-

contained to preclude run-on and run-off, covered with a roof or overhang, and equipped with a clarifier or other pretreatment facility; and (2) properly connected to a sanitary sewer.

Non-Retail Fueling Areas - Non-Retail fueling areas shall be designed with the following: Fuel dispensing area that is: (1) paved with Portland cement concrete or equivalent smooth impervious surface (asphalt concrete is prohibited); (2) designed to extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less; (3) sloped to prevent ponding; (4) separated from the rest of the site by a grade break that prevents run-on of urban runoff; and (5) designed to drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.
Overhanging roof structure or canopy that is: (1) equal to or greater than the area within the fuel dispensing area's grade break; and (2) designed not to drain onto or across the fuel dispensing area.

Storm Drain Stenciling
Storm drain stenciling involves labeling storm drain inlets with painted messages warning citizens not to dump pollutants into the drains. The stenciled messages are generally a simple phrase to remind passersby that the storm drains connect to local water bodies (and not to a sanitary sewer system) and that dumping pollutes those waters. Some specify which water body the inlet drains to or name the particular river, lake, or bay. Commonly stenciled messages include:

- "No Dumping. Drains to Water Source"
- "Drains to River"
- "You Dump it, You Drink it. No Waste Here."

Pictures can also be used to convey the message, including a dolphin, whale, duck, common game fish, or a graphic depiction of the path from drain to waterbody. Communities with a large Spanish-speaking population might wish to develop stencils in both English and Spanish, or use a graphic.

Trash Storage Area Design
Storage areas such as for landscaping supplies and trash storage areas will be designed to contain materials stored in these areas and to prevent debris from being distributed into storm water collection areas. For example, dumpsters will be kept in a separate enclosed area to prevent debris from being scattered by wind or animals.

TREATMENT CONTROL BMPS

Post-construction "treatment control" storm water management BMPs provide treatment for storm water emanating from the project site. Implementation of NPDES General Permit requirements entails the use of post-construction BMPs that will remain in service to protect water quality throughout the life of the project. Structural BMPs are an integral element of post-construction storm water management and include storage, filtration, and infiltration practices. BMPs have varying degrees of effectiveness versus different pollutants of concern.

The selection, design and sitting of structural BMPs within a project depend largely on the project-wide drainage plan. BMP alternatives were evaluated for their relative effectiveness for treating potential pollutants from the project site; technical feasibility; relative costs and benefits; and applicable legal, institutional, and other constraints.

Table 3 Structural Treatment Control BMP Selection Matrix (San Diego County, 2002)

○ High Removal Efficiency ◒ Medium Removal Efficiency ● Low Removal Efficiency ? Unknown Removal Efficiency	**Treatment Control BMP Categories**						
Pollutant of Concern	Biofilters	Detention Basins	Infiltration Basins[1]	Wet Ponds or Wetlands	Drainage Inserts	Filtration	Hydrodynamic Separator Systems [2]
Sediment	◒	○	○	○	◒	○	◒
Nutrients	●	◒	◒	◒	◒	◒	●
Heavy Metals	◒	◒	◒	○	◒	○	●
Organic Compounds	?	?	?	?	●	◒	●
Trash & Debris	●	○	?	?	◒	○	◒
Oxygen Demanding Substances	●	◒	◒	◒	●	◒	●
Bacteria	?	?	○	?	●	◒	●
Oils and Grease	◒	◒	?	?	●	○	●
Pesticides	?	?	?	?	●	?	●

(1) Including trenches and porous pavement. (2) Also known as hydrodynamic devices and baffle boxes. ***Original Sources:*** *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993), National Stormwater Best Management Practices Database (2001), and Guide for BMP Selection in Urban Developed Areas (2001).*

Existing and Post-Construction Drainage

In the existing condition, storm water falling onto the easterly third of the property sheet flow in a southwesterly direction toward Old Highway 80. The flows then become concentrated and continue down Old Highway 80 in the westerly direction. The flows are then intercepted by an existing 24"culvert with headwall on the north side of Old Highway 80 just outside the property's frontage. Flows from the westerly third are captured by an existing swale at the property's westerly boundary and are discharged to the right-of-way of Old Highway 80. These flows continue along Old Highway 80 to its intersection with Lake Jennings Park Road and are undergrounded at that location. The storm water falling onto the center third of the property is concentrated onsite in the existing natural valley and flows in the southwesterly direction to the edge of Old Highway 80 where it joins the other flows destined for the aforementioned culvert structure. The adjacent properties to the east and west are graded or improved in such a manner so as to preclude any storm water from entering the subject property in the existing condition. Runoff from a portion of the right of way of Interstate 8 is discharged to the subject property in the existing condition. The area of the contributing basin is relatively small due to the super-elevated nature of Interstate 8 along the shared boundary. These flows are directed by Caltrans surface facilities to the beginning of the existing natural valley, which traverses the property in the southwesterly direction.

In the proposed condition, storm water falling onto easterly portion of the site will sheet flow in a southwesterly direction to one of two proposed inlets in that area. Both of these inlets shall be constructed with a Flo-Gard Plus filter insert to treat the 85th percentile stormwater flows. Once undergrounded, the flows will then be transmitted to a cleanwater underground detention facility and will ultimately be discharged to a curb outlet within the right-of-way of Old Highway 80. The flows then proceed westerly in the gutter to a proposed curb inlet at the most westerly access drive and are undergrounded and taken into the aforementioned, existing 24" culvert and continue in a manner consistent with the existing condition. The stormwater falling onto the center portion of the project site is intercepted by proposed concrete swales and is transmitted to filter equipped inlets at the easterly and westerly ends of the swales. Once underground, the flows are transmitted to a Water Quality Inlet for treatment and then on to a second cleanwater underground detention facility. The offsite flows originating within the right-of-way of Interstate 8 are captured at the project's northerly boundary by a filter equipped inlet and are routed underground to this second underground detention facility. Flows from this second detention facility are then transmitted underground to the existing 24" culvert and continue as in the existing condition. Stormwater falling onto the westerly third of the project site is intercepted by proposed swales and transmitted to filter equipped inlets. Once underground these flows are transmitted to a Water Quality Inlet for treatment and then on third cleanwater underground detention facility. Flows from this third detention facility are discharged into the existing swale at the project's westerly boundary and continue in a manner consistent with the existing condition to the intersection of Old Highway 80 and Lake Jennings Park Road.

Table 4 Summary of Hydrology Analysis			
Area	**Tributary Area**	**Q_{100}**	**Q_{WQ}**
A	**1.08 Acres**	**6.63 C.F.S.**	**1.80 C.F.S.**
B	**5.40 Acres**	**10.67 C.F.S.**	**2.75 C.F.S.**
C	**1.60 Acres**	**7.30 C.F.S.**	**1.98 C.F.S.**

Size of filter shall be based on 85th percentile volume:

Catch Basins A,B,C,D: A: Q_{85}^{th} = 808 GPM
B: Q_{85}^{th} = 1234 GPM
C: Q_{85}^{th} = 889 GPM

Treatment Control BMP's Selected for the Project:
The selection, design and siting of structural BMPs within a project depend largely on the project-wide drainage plan. BMP alternatives were evaluated for their relative effectiveness for treating potential pollutants from the project site; technical feasibility; relative costs and benefits; and applicable legal, institutional, and other constraints.

The selection of treatment control BMPs is limited in the context of the current project site. Wet ponds, wetlands, extended detention basins are not feasible due to limited space on the site, expanding the project footprint to accommodate these space-intensive BMPs would necessitate additional grading, which would be costly and counterproductive to the goal of minimizing the area disturbed by construction on the site. Infiltration practices are not practicable primarily because of unsuitable soil conditions on the site. Therefore, the most practicable treatment-control BMP strategy is to outfit catch basins in the parking lots with filter inserts

Biofilters
☐Grass swale
☐Grass strip
☐Wetland vegetation swale
☐Bioretention

Detention Basins
☐Extended/dry detention basin with grass lining
☐Extended/dry detention basin with impervious lining

Infiltration Basins
☐Infiltration basin
☐Infiltration trench
☐Porous asphalt
☐Porous concrete
☐Porous modular concrete block

Wet Ponds or Wetlands
- ☐ Wet pond/basin (permanent pool)
- ☐ Constructed wetland

Drainage Inserts (See note below)
- ☒ Oil/Water separator (Water Quality Inlet)
- ☒ Catch basin insert
- ☐ Storm drain inserts
- ☐ Catch basin screens

Filtration
- ☐ Media filtration
- ☐ Sand filtration

Hydrodynamic Separator Systems
- ☒ Swirl Concentrator
- ☐ Cyclone Separator
- ☐ Baffle Separator
- ☐ Gross Solids Removal Device
- ☐ Linear Radial Device

FISCAL RESOURCES

The provision of the fiscal resources necessary to ensure the proper adherence to this Storm Water Management Plan and to ensure the water quality of the storm water discharged from the project site shall be the responsibility of:

Black Gold L.L.C.
9338 Bond Avenue,
El Cajon, CA 92021

At no such time shall the maintenance of the post-construction BMPs go unperformed for any reason.

The San Diego Watershed Protection Ordinance requires that mechanism be in place to ensure maintenance of post-construction BMPs. The maintenance mechanisms listed by the Ordinance include: County maintenance; maintenance by another public entity; maintenance by subsequent owner(s); a County Service Area or Special Assessment District; provisions of a lease; provisions of a conditional use permit; or other mechanisms as acceptable to the County.

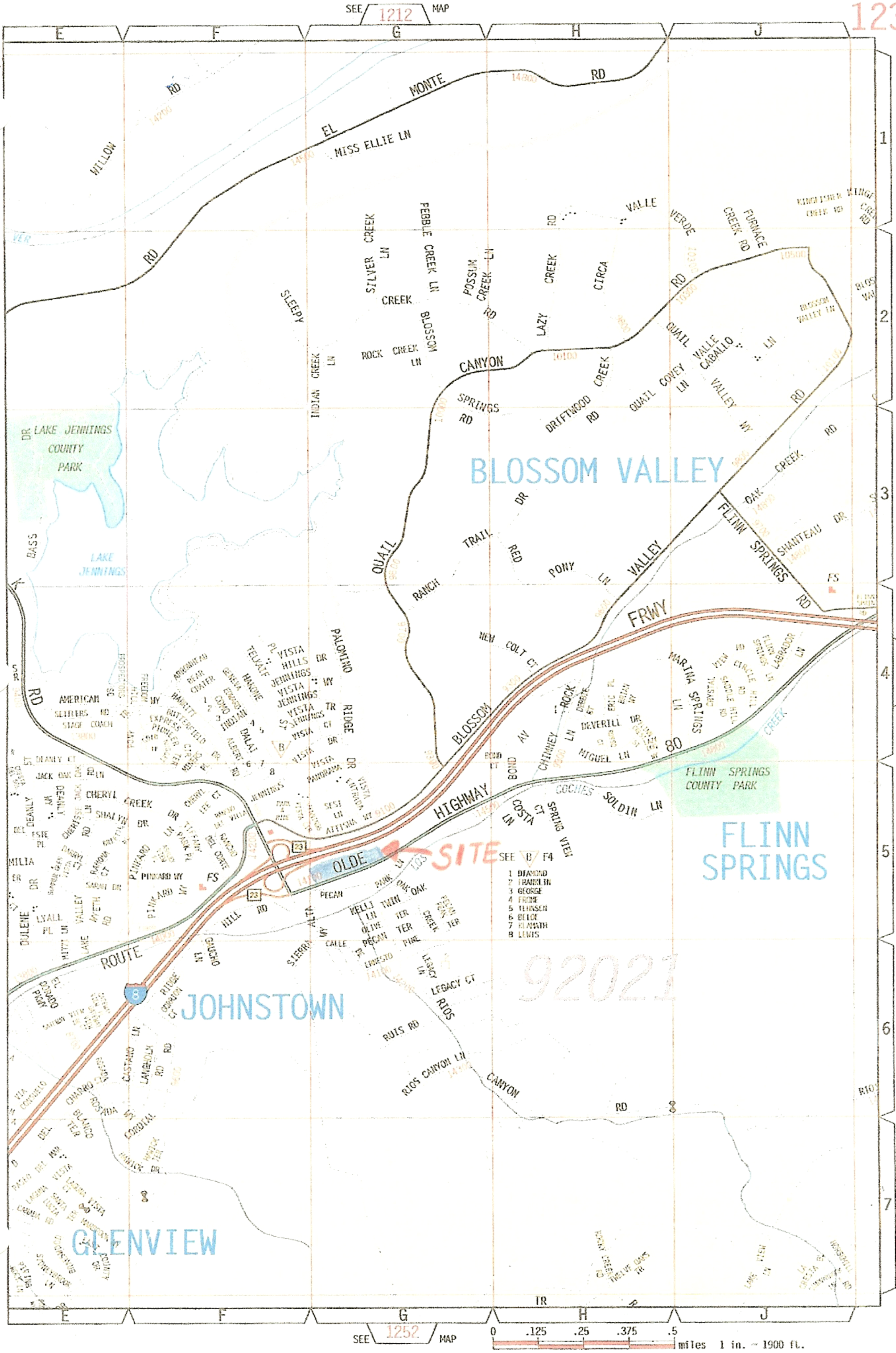
Treatment control stormwater BMPs fall into four primary maintenance categories: (1) minimal maintenance BMPs; (2) BMPs requiring ongoing maintenance; (3) BMPs requiring maintenance by Flood Control District, with funding tied to the specific project, and (4) BMPs where there is a broader public responsibility for maintenance, with funding mechanisms beyond the project. **Table 5** summarizes the treatment control BMPs selected for the project site and the maintenance category they fall under.

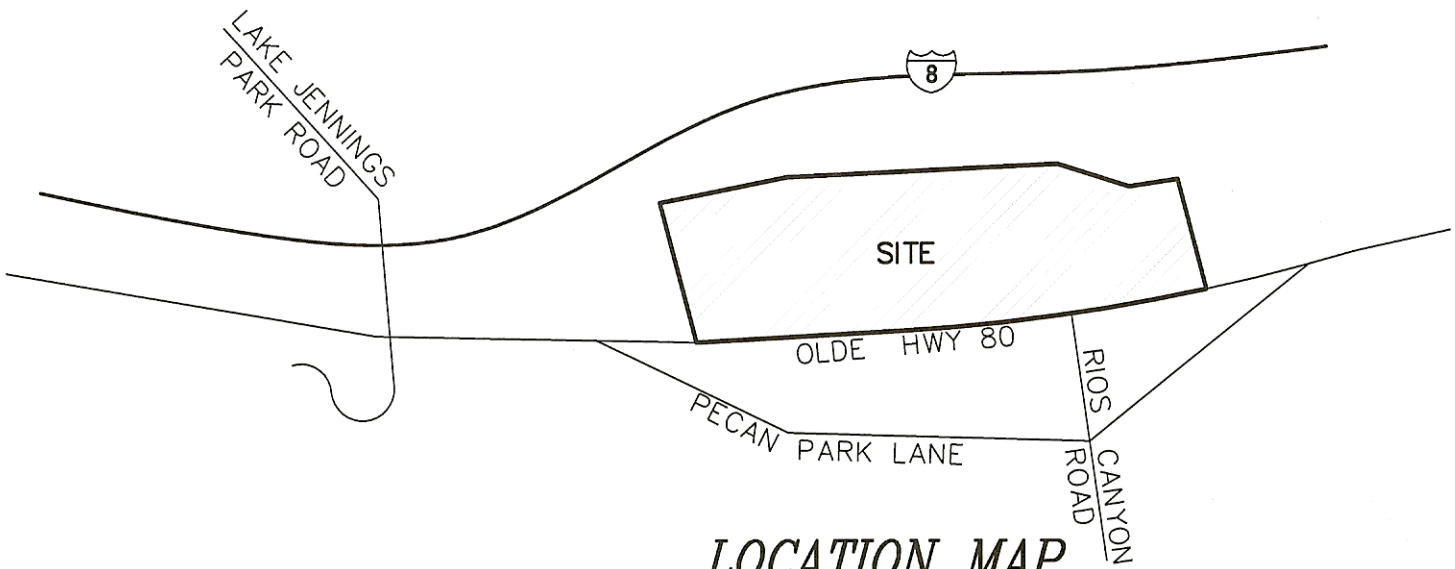
Table 5 Selected BMPs and Corresponding Maintenance Category.

BMP Type / Location	Funding Type
Filter Insert	Category 2 (Private Maintenance w/ Easement and Security)
Vortex Separator	Category 2 (Private Maintenance w/ Easement and Security)
Water Quality Inlet	Category 2 (Private Maintenance w/ Easement and Security)
Underground Detention Basin	Category 2 (Private Maintenance w/ Easement and Security)

It is estimated, at the time of the preparation of this report, that the yearly expense for all scheduled maintenance of the stormwater equipment onsite is approximately $10,530.00. This includes approximately $330.00 per unit for the filter-equipped inlets and approximately $1,200.00 per unit for each Water quality inlet, $1500 per unit for each underground detention facility, $330.00 per unit for the Vortex separator. This estimate includes the inspection and service listed in previous section. This estimate does not account for any ‘as needed’ revisions to the maintenance schedule, any unforeseen expenses for damaged structures or any increases due to inflationary pressures.

APPENDIX A


SEE 1212 MAP
SEE 1252 MAP
SEE 1233 MAP
© 2005 Thomas Bros. Maps
EL MONTE RD
MISS ELLIE LN
WILLOW RD
BLOSSOM VALLEY
FLINN SPRINGS
FLINN SPRINGS COUNTY PARK
LAKE JENNINGS COUNTY PARK
LAKE JENNINGS
JOHNSTOWN
GLENVIEW
CANYON SPRINGS RD
QUAIL RANCH
BLOSSOM VALLEY RD
FLINN SPRINGS RD
OLDE HIGHWAY 80
FRWY
ROUTE
RIOS CANYON RD
SITE
SEE 1B F4
1 DIAMOND
2 FRANKLIN
3 GEORGE
4 FROME
5 TENNSEN
6 BELOT
7 KLAMATH
8 LEWIS
92021
0 .125 .25 .375 .5 miles 1 in. = 1900 ft.



LOCATION MAP

NO SCALE

THOMAS BROS. COORDINATES: 1232 G-5

HALE ENGINEERING

CIVIL ENGINEERING SURVEYING LAND PLANNING

7910 CONVOY COURT
SAN DIEGO, CA 92111

(858) 715-1420
(858) 715-1424 FAX

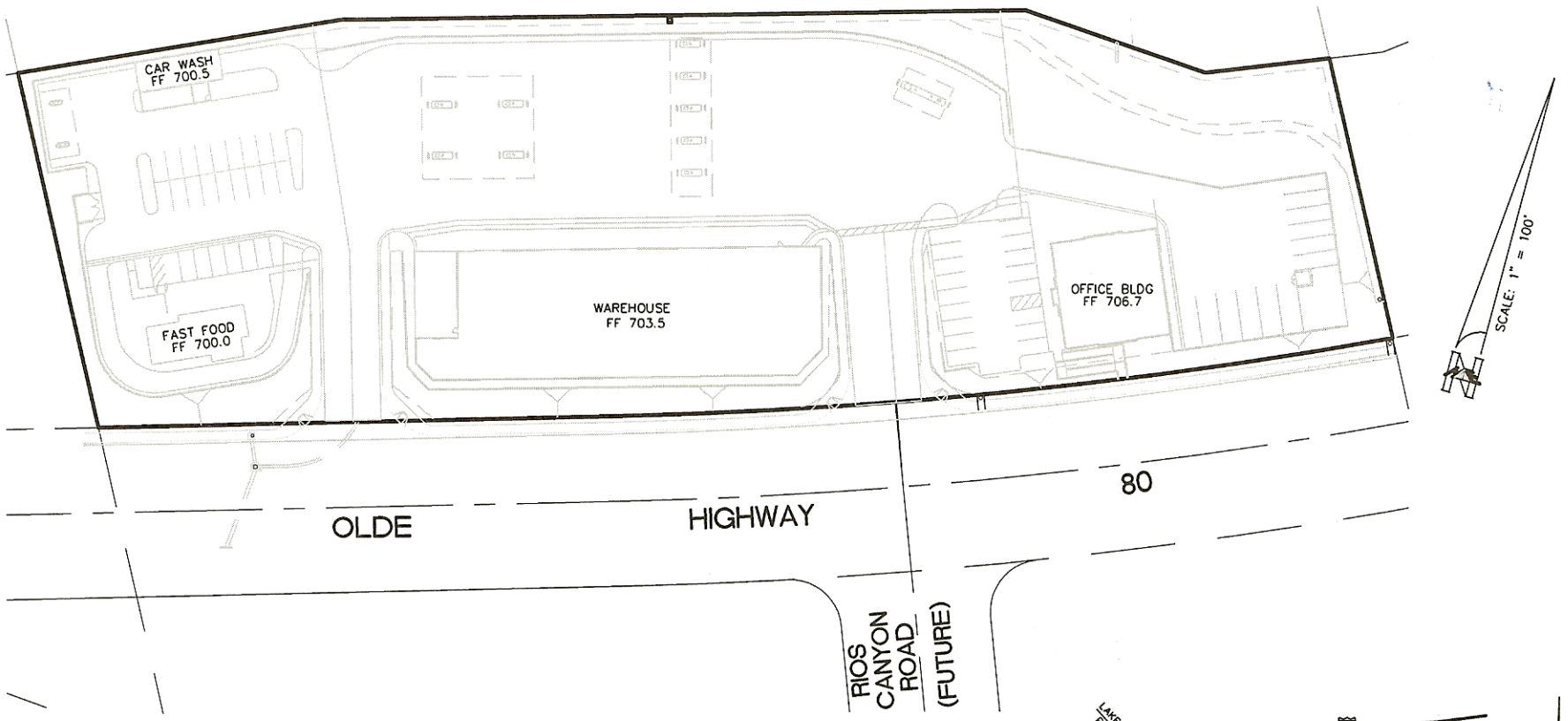
LOCATION MAP FOR:

BLACK GOLD

APPENDIX B

PROJECT SITE MAP OF BLACK GOLD

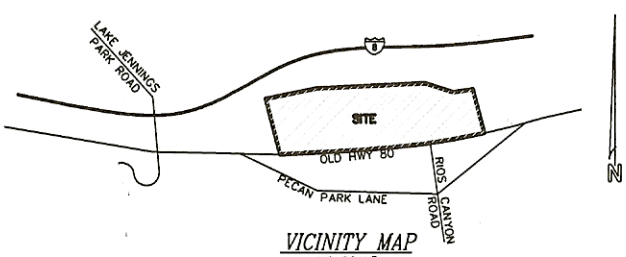
COUNTY OF SAN DIEGO



100 0 100 200 300

SCALE 1" = 100'

KEY MAP SCALE: 1"=100'



VICINITY MAP
NO SCALE
THOMAS BROS. COORDINATES: 1232 G-5

DESCRIPTION	*SYMBOL*
PROPERTY BOUNDARY	———

OWNERS/SUBDIVIDER

J.R. COLLINS
P.O. BOX 2602
CRYSTAL BEACH, TEXAS 77650

APPLICANT

BLACK GOLD , LLC
9338 BOND AVENUE,
EL CAJON, CA 92021
ATTN: BROCK A. PARRY
619-390-3400

HALE ENGINEERING
CIVIL ENGINEERING SURVEYING LAND PLANNING
7910 CONVOY COURT
SAN DIEGO, CA 92111
(858) 715-1420
(858) 715-1424 FAX

PROJECT SITE MAP FOR:

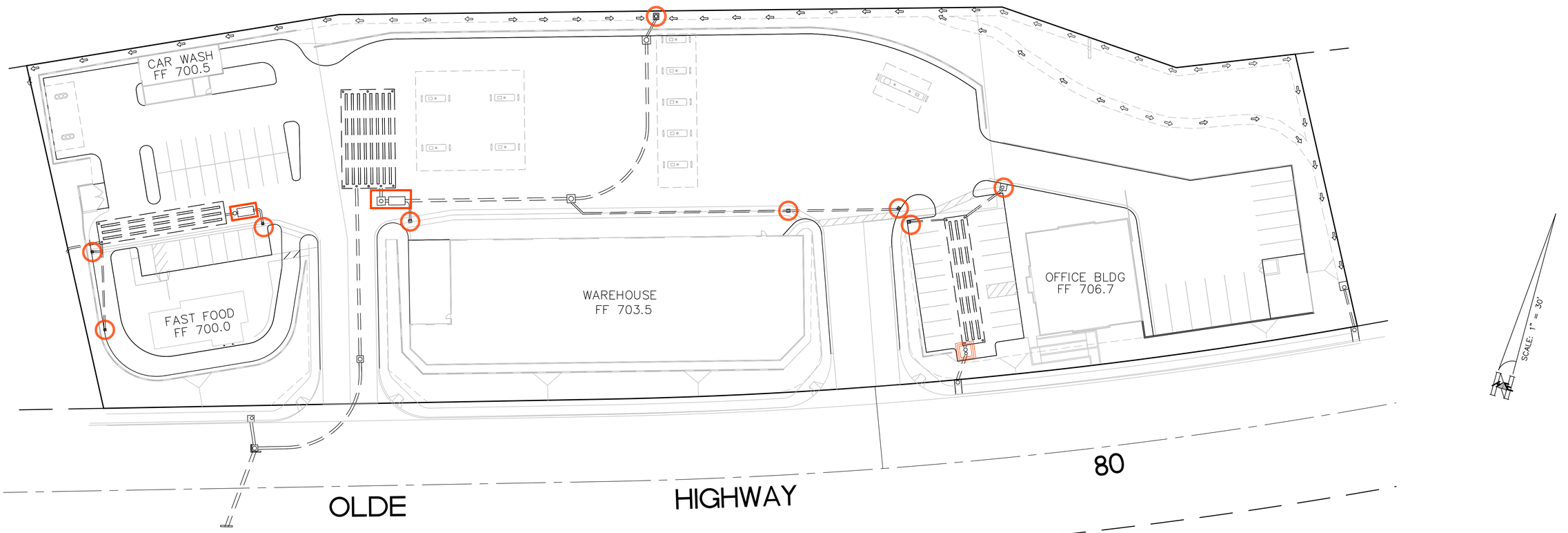
BLACK GOLD

H.E. JOB NO: 0243 2/05/07

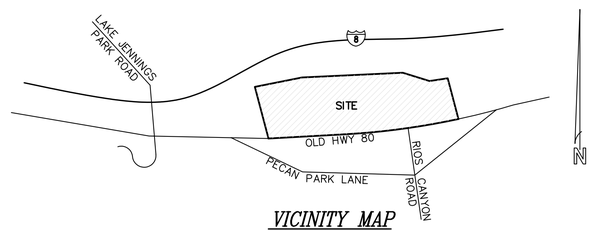
APPENDIX D

BMP MAP FOR BLACK GOLD

COUNTY OF SAN DIEGO



KEY MAP
SCALE: 1"=40'



VICINITY MAP
NO SCALE
THOMAS BROS. COORDINATES: 1232 G-5

30 0 30 60 90
SCALE 1" = 30'

DESCRIPTION — *SYMBOL*

- PROPERTY BOUNDARY
- FILTER EQUIPPED INLET STRUCTURE
- UNDERGROUND DETENTION FACILITY
- VORTEX SEPARATOR
- WATER QUALITY INLET
- PROPOSED PCC BROW DITCH (TYPE B) D-75

OWNERS/SUBDIVIDER
J.R. COLLINS
P.O. BOX 2602
CRYSTAL BEACH, TEXAS 77650

APPLICANT
BLACK GOLD, LLC
9338 BOND AVENUE,
EL CAJON, CA 92021
ATTN: BROCK A. PARRY
619-390-3400

CIVIL ENGINEER
HALE ENGINEERING
7910 CONVOY COURT,
SAN DIEGO, CA 92111

HALE ENGINEERING
CIVIL ENGINEERING SURVEYING LAND PLANNING
7910 CONVOY COURT (858) 715-1420
SAN DIEGO, CA 92111 (858) 715-1424 FAX

BMP MAP FOR:

BLACK GOLD

H.E. JOB NO: 0243 3/21/07

APPENDIX E

CURB INLET AND CATCH BASIN FILTERS /INSERTS:

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris and provide some level of runoff contamination removal. They are available in various shapes and configurations with applications ranging from trash and debris removal to carbon adsorption of aliphatic and aromatic hydrocarbons and heavy metals removal. Catch basin inserts remove litter, settable solids (debris), and total suspended solids (TSS). Pollutants, such as heavy metals, that are attached (adsorbed) to the settled particulate matter will also be removed.

The installation of filters in the curb inlets and catch basins is intended to improve the quality of the storm water discharged from the project site.

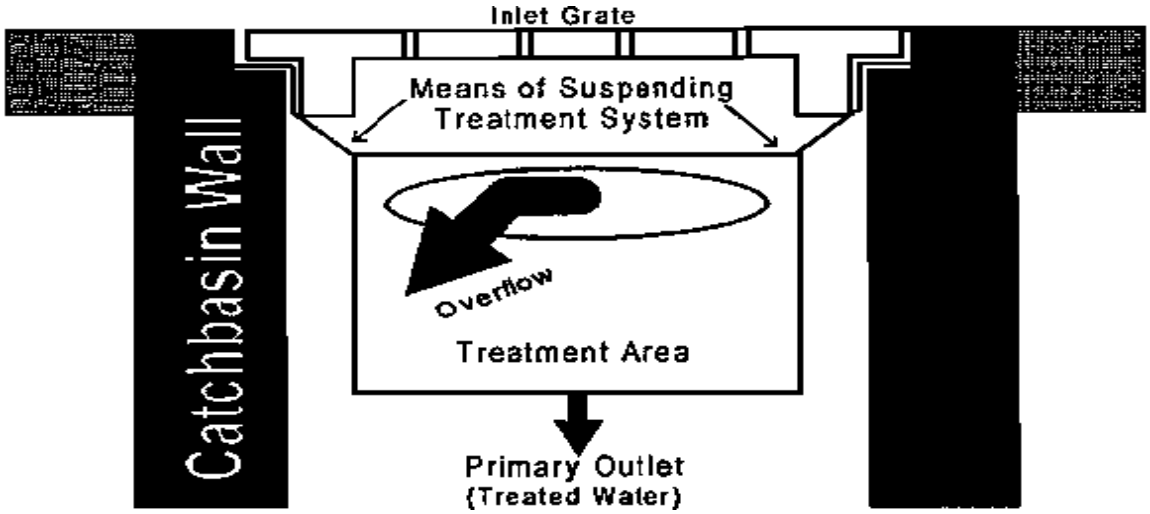


Figure 1 Typical features of a Catch Basin Insert (King County, Washington, 1995).

Appropriate Applications and Siting Constraints

Drain Inserts should be considered for implementation wherever site conditions allow. One important siting constraint is that they are not suitable for removal of fine particulate storm water pollutants such as silts or clays; however, they can be used in unpaved areas where the sediment concentration in the storm water is expected to contain coarse material. In addition, Catch Basin Inserts (CBIs) are suited for sites where a substantial amount of debris is found in storm water runoff. They are best suited for installation as pretreatment of other BMPs to remove large sediment or debris from unpaved or pervious areas. A second siting requirement is that they are usually not suitable for large areas or areas with trash or leaves than can plug the insert. They are very effective at allowing the flow of water to continue while retaining unwanted substances.

Catch Basin Filters – The installation of a filter in the catch basin is intended to improve the quality of the storm water discharged from the project site and mitigate for the possible pollutants listed below:

Trash and Debris – Medium efficiency	Sediments - Medium efficiency
Heavy Metals - Medium efficiency	Nutrients - Medium efficiency

Organic Compounds - Low efficiency Oil and Grease - Low efficiency
Oxygen Demanding Substances (incl. Solvents) - Low efficiency
Bacteria – Low efficiency

Factors Affecting Preliminary Design:

Catch basin inserts (CBIs) are designed either to hang from a drain-inlet frame or to be inserted well below the drain inlet in the sump area, taking advantage of additional space in the lower part of the catch basin. CBIs work by gravitational filtering to remove debris and large (gravel-sized) sediment particles entering the catch basin. Some of the insert models also are designed with an inner component that contains an oil-absorbent material to facilitate in the removal process. It is important; therefore, to specify which pollutant is of primary importance because systems optimized for one pollutant may not be efficient for other pollutant.

CBI devices are designed to be suspended from the storm drain inlet structure. Hydraulically, they are designed with a high-flow bypass to prevent resuspension and washout. Only the designed flow rate should pass through treatment surfaces. The insert can contain one or more treatment mechanisms, which include filtration, sedimentation, or gravitational absorption of oils. Two outlets also are designed into the devices. The first outlet is for treated storm water, and the second is for storm water that exceeds the capacity of the device. In some manufactured CBIs, the overflow outlet is not a true bypass because excess water still contacts the treatment area prior to overflow.

Table 1 Summary of Catch Basin Insert Design Factors

Description	Applications/Siting	Preliminary Design Factors
Manufactured filters or fabric placed in a drop inlet to remove sediment and debris and provide some level of runoff contamination removal. Treatment Mechanisms: • Filtration • Adsorption Pollutants removed: • Trash, debris and sediments • Oils, grease, heavy metals	• CBIs are appropriate in areas like unpaved roads or parking areas where the storm water is expected to contain coarse material. • Catch basin inserts should not be used for removal of fine particulate storm water pollutants such as silts or clays • They are best suited for installation as pretreatment of other BMPs to remove large sediment or debris from unpaved or pervious areas.	• Designed either to hang from a drain-inlet frame or to be inserted well below the drain inlet in the sump area. • CBIs work by gravitational filtering to remove debris and large (gravel-sized) sediment particles entering the catch basin. • Hydraulically, they are designed with a high-flow bypass to prevent resuspension and washout. • Two outlets also are designed into the devices. The first outlet is for treated storm water, and the second is for storm water that exceeds the capacity of the device.

WATER QUALITY INLET:

Water quality inlets (WQIs), also commonly called trapping catch basins, oil/grit separators or oil/water separators, consist of one or more chambers that promote sedimentation of coarse materials and separation of free oil (as opposed to emulsified or dissolved oil) from stormwater. Some WQIs also contain screens to help retain larger or floating debris, and many of the newer designs also include a coalescing unit that helps promote oil/water separation. A typical WQI, as shown in the schematic, consists of a sedimentation chamber, an oil separation chamber, and a discharge chamber. These devices are appropriate for capturing hydrocarbon spills, but provide very marginal sediment removal and are not very effective for treatment of stormwater runoff.

The installation of Water quality inlets is intended to improve the quality of the storm water discharged from the project site and mitigate for the possible pollutants listed below:

Trash and Debris – Medium efficiency
Oil and Grease - Medium efficiency
Heavy Metals - Low efficiency
Sediments - Low efficiency
Nutrients - Low efficiency
Organic Compounds - Low efficiency
Bacteria – Low efficiency

Appropriate Applications and Siting Constraints

Water quality inlets should be considered for implementation wherever site conditions allow. Oil/water separation units are often utilized in specific industrial areas, such as airport aprons, equipment washdown areas, or vehicle storage areas. In these instances, runoff from the area of concern will usually be diverted directly into the unit, while all other runoff is sent to the storm drain downstream from the oil/water separator. Oil/water separation tanks are often fitted with diffusion baffles at the inlets to prevent turbulent flow from entering the unit and resuspending settled pollutants.

Factors Affecting Preliminary Design:

Prior to WQI design, the site should be evaluated to determine if another BMP would be more cost-effective in removing the pollutants of concern. WQIs should be used when no other BMP is feasible. The WQI should be constructed near a storm drain network so that flow can be easily diverted to the WQI for treatment (NVPDC, 1992). Any construction activities within the drainage area should be completed before installation of the WQI, and the drainage area should be revegetated so that the sediment loading to the WQI is minimized.

WQIs are most effective for small drainage areas. Drainage areas of 0.4 hectares (1 acre) or less are often recommended. WQIs are typically used in an off-line configuration (i.e., portions of runoff are diverted to the WQI), but they can be used as on-line units (i.e., receive all runoff). Generally, off-line units are designed to handle the first 1.3 centimeters (0.5 inches) of runoff from the drainage areas. Upstream isolation/diversion structures can be used to divert the water to the off-line structure (Schueler, 1992). On-

line units receive higher flows that will likely cause increased turbulence and resuspension of settled material, thereby reducing WQI performance.
Oil/water separation tanks are often fitted with diffusion baffles at the inlets to prevent turbulent flow from entering the unit and resuspending settled pollutants. WQIs are available as pre-manufactured units or can be cast in place. Reinforced concrete should be used to construct below-grade WQIs. The WQIs should be water tight to prevent possible ground water contamination.

Table 2 Summary of Water Quality Inlet Design Factors

Description	Applications/Siting	Preliminary Design Factors
Water quality inlets (WQIs) consist of one or more chambers that promote sedimentation of coarse materials and separation of free oil (as opposed to emulsified or dissolved oil) from stormwater. Treatment Mechanisms: • Filtration • Adsorption Pollutants removed: • Trash, debris and sediments Oils, grease, heavy metals	• WQIs are often utilized in specific industrial areas, where the storm water is expected to contain coarse material. • Oil/water separation tanks are often fitted with diffusion baffles at the inlets to prevent turbulent flow from entering the unit and resuspending settled pollutants. • They are best suited for installation as pretreatment of other BMPs to remove large sediment or debris from unpaved or pervious areas.	• Designed either to hang from a drain-inlet frame or to be inserted well below the drain inlet in the sump area. • CBIs work by gravitational filtering to remove debris and large (gravel-sized) sediment particles entering the catch basin. • Hydraulically, they are designed with a high-flow bypass to prevent resuspension and washout. • Two outlets also are designed into the devices. The first outlet is for treated storm water, and the second is for storm water that exceeds the capacity of the device.

VORTEX SEPARATOR:

Vortex separators (alternatively, swirl concentrators) are gravity separators that employ vortex technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. By having the water move in a circular fashion, rather than a straight line, as is the case with a standard wet vault, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space. Vortex separators were originally developed for combined sewer overflows (CSOs), where it is used primarily to remove coarse inorganic solids.

The installation of vortex separators is intended to improve the quality of the storm water discharged from the project site and mitigate for the possible pollutants listed below:

Sediments – Medium efficiency
Trash and Debris – Medium efficiency
Oil and Grease – Low efficiency
Heavy Metals – Low efficiency
Nutrients – Low efficiency
Organic Compounds – Low efficiency
Oxygen Demanding Substances (incl. Solvents) – Low efficiency
Pesticides – Low efficiency

Appropriate Applications and Siting Constraints

Vortex Separators should be considered for implementation wherever site conditions allow. They are effective in High-density and single-family residential sites. Because of their ability to efficiently remove storm water runoff pollutants, vortex separators can be used as a stand-alone BMP. They are also best suited for installation as pretreatment of other BMPs to remove large sediment or debris from unpaved or pervious areas. There are no particularly unique siting criteria. The size of the drainage area that can be served by vortex separators is directly related to the capacities of the largest models.

Factors Affecting Preliminary Design:

The stormwater enters, typically below the effluent line, tangentially into the basin, thereby imparting a circular motion in the system. Due to centrifugal forces created by the circular motion, the suspended particles move to the center of the device where they settle to the bottom. It has been stated with respect to CSOs that the practical lower limit of vortex separation is a particle with a settling velocity of 12 to 16.5 feet per hour (0.10 to 0.14 cm/s). As such, the focus for vortex separation in CSOs has been with settleable solids generally 200 microns and larger, given the presence of the lighter organic solids. For inorganic sediment, the above settling velocity range represents a particle diameter of 50 to 100 microns. Head loss is a function of the size of the target particle. At 200 microns it is normally minor but increases significantly if the goal is to remove smaller particles.

- Sized is based on the peak flow of the design treatment event as specified by local government.
- Headloss differs with the product and the model but is generally on the order of one foot or less in most cases.

Design and performance of the storm water treatment system depends on factors like site size, site runoff coefficient, regional rainfall intensity distribution and anticipated pollutant characteristics.

Table 3 Summary of Vortex Separator Design Factors

Description	Applications/Siting	Preliminary Design Factors
▪ Vortex separators are gravity separators that employ vortex technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. ▪ Treatment Mechanisms: ▪ Filtration ▪ Adsorption ▪ Pollutants removed: ▪ Trash, debris and sediments ▪ Oils, grease	▪ Effective in Commercial, High-density and single-family residential sites ▪ Can be used as a stand-alone BMP ▪ Well suited for installation as pretreatment of other BMPs to remove large sediment or debris from unpaved or pervious areas	▪ Sized is based on the peak flow of the design treatment event. ▪ Head loss differs with the product and the model but is generally on the order of one foot or less in most cases. ▪ Size of site, site runoff coefficient, regional rainfall intensity distribution and anticipated pollutant characteristics.

UNDERGROUND DETENTION FACILITY:

The project features three underground detention facilities. With filter inserts and water quality inlets acting as treatment control devices, the underground detention facilities would collect the storm water on the site and ensure transmit it offsite without significant change in the peak flow.

APPENDIX F

OPERATION AND MAINTENANCE PROGRAM
The maintenance activities to be performed to ensure the proper performance of the BMPs in place shall include:

WATER QUALITY INLET:

The operational maintenance needs of the Water Quality Inlet used on the project site are:

- Routine inspection of the structures general condition as well as quantity of floatable material present, depth of non-floatable collected material and absorbent media condition.
- Servicing of the interceptor in accordance with the manufacturers specifications including removal of floatable material, out-pumping of non-floatable collected material and replacement of absorbent media as required.

Inspection Frequency

- Interceptor assembly shall be inspected and serviced every 4 months at a minimum and after major storm events. If it is determined, based on site conditions or the condition of the interceptor assembly, that the inspection interval is infrequent enough for proper operation, the inspection schedule shall be reevaluated and a revised schedule shall be implemented.

Preventative Maintenance

- **Inspection:** Inspection of the interceptor device consists of removal of inspection cover and the performance of a visual inspection to include level of floatable trash and debris, level of non-floatable collected material and condition of absorbent media by color. The visible areas of the interceptor shall be inspected for damage and serviceability. The cover shall then be reset.
- **Service:** Service interval will include and be initiated by the inspection procedure and shall include the removal of floatable debris and the out-pumping of non-floatable collected material and may include the replacement of the absorbent media if required by visual condition. The cover shall then be reset.
- **Media Change Procedure:** Changing of the absorbent media involves the aforementioned inspection and service procedures plus the placement of the used media into a DOT approved container for proper disposal. The media shall then be replaced. The method of disposal of the used media shall comply with all federal, state and local regulations.

Corrective Maintenance

- If it is determined, based on site conditions or the condition of the interceptor assembly, that the inspection and/or service interval is infrequent enough for proper operation, the inspection and/or service schedule shall be reevaluated and a revised schedule shall be implemented.

Table 1 Maintenance Program for Water Quality Inlet(s).	
Inspection Frequency/Indications:	First Year ❑ Before wet season begins (October); ❑ After rainfall events greater than 0.5 inches; ❑ After wet season (May). Subsequent Years ❑ Before wet season begins (October)
Maintenance Indications	**Maintenance Activities**
❑ Trash and debris interfering with function of inlet	❑ Remove trash and debris
❑ Broken or damaged inlet	❑ Repair inlet
❑ Sediment clogging	❑ Remove sediment
❑ Insert adsorbent material at capacity	❑ Replace adsorbent material when it has reached capacity or at an intervals recommended by manufacturer

CATCH BASIN FILTERS:

The operational maintenance needs of the filters used on the project site are:

- Routine inspection of filter assembly including grates, and filters units.
- Servicing of filter unit in accordance with the manufacturer's specifications.

Inspection Frequency

- Catch basin and filter assemblies shall be inspected and serviced every 4 months at a minimum. If it is determined, based on site conditions or the condition of the filter assembly, that the inspection interval is infrequent enough for proper operation, the inspection schedule shall be reevaluated and a revised schedule shall be implemented.

Preventative Maintenance

- **Inspection:** Inspection of an installed filter device consists of broom cleaning and visual inspection. Debris shall be removed from around the drainage inlet, the grate shall be removed and debris shall be removed from the top of the filter and on the grate ledge. The visible areas of the filter shall be inspected for damage and serviceability. The grate shall be reset and debris disposed of properly.
- **Service:** Service consists of the aforementioned inspection procedures plus removal of the filter assembly. The structure of the assembly shall be inspected for serviceability and shall be brush cleaned. The filter media containers shall be brush cleaned and the filter media mixed and inspected for remaining useful life. The filter and grate shall then be reset.
- **Media Change Procedure:** Changing of the filter medium involves the aforementioned inspection and service procedures plus the placement of the used filter media into a DOT approved container for proper disposal. The filter media

container shall be replaced with new media. The method of disposal of the used media shall comply with all federal, state and local regulations.

Corrective Maintenance

- If it is determined, based on site conditions or the condition of the filter assembly, that the inspection and/or service interval is infrequent enough for proper operation, the inspection and/or service schedule shall be reevaluated and a revised schedule shall be implemented.

The maintenance of the filters installed in the catch basins shall be undertaken in accordance with the specifications set forth in the manufacturers Maintenance Guidelines.

Table 2 Maintenance Program for Filter Insert(s).	
Inspection Frequency/Indications:	First Year ❑ Before wet season begins (October); ❑ After rainfall events greater than 0.5 inches; ❑ After wet season (May). Subsequent Years ❑ Before wet season begins (October)
Maintenance Indications	**Maintenance Activities**
❑ Trash and debris interfering with function of insert	❑ Remove trash and debris
❑ Broken or damaged insert	❑ Repair inlet insert
❑ Sediment clogging	❑ Remove sediment
❑ Insert adsorbent material at capacity	❑ Replace adsorbent material when it has reached capacity or at an intervals recommended by manufacturer

UNDERGROUND DETENTION BASIN:

The operational and maintenance needs of an Underground Detention Basin (UDB) are:

- Dispersion of alluvial sediment deposition at inlet structures thus limiting the extended localized ponding of water
- Periodic sediment removal
- Monitoring of the basin to ensure it is properly drained.
- Outlet riser cleaning.
- Removal of graffiti, litter, and debris.
- Preventative maintenance on monitoring equipment.

Inspection Frequency

- Once a month at a minimum.
- After every large storm (after every storm monitored or those storms with more than 0.50 inch of precipitation).

Preventive Maintenance

Preventive maintenance activities to be instituted at an UDB are:

- **Trash and Debris:** During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.
- **Sediment Management:** Alluvial deposits at the inlet structures may create zones of ponded water. Upon these occurrences sediment grading will be accomplished by manually raking the deposits.
- **Sediment Removal**: Surface sediments will be removed on a periodic basis. Disposal of sediments will comply with applicable local, county, state, or federal requirements.
- **Mechanical Components:** Regularly scheduled maintenance will be performed on valves and access hatches in accordance with the manufacturers' recommendations.

Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of an UDB. Corrective maintenance activities include:

- **Removal of Debris and Sediment:** Sediment, debris, and trash, which threaten the ability of an UDB to store or convey water, will be removed immediately and properly disposed of.
- **Structural Repairs:** Repairs to any structural component of an UDB will be made promptly (e.g., within 10 working days). Designers and contractors will conduct repairs where structural damage has occurred.
- **General Facility Maintenance**: In addition to the above elements of corrective maintenance, general corrective maintenance will address the overall facility and it's associated components. If corrective maintenance is being done to one component, other components will be inspected to see if maintenance is needed.

Debris and Sediment Disposal

Black Gold L.L.C. is responsible for any hazardous waste generated at an UDB since they are responsible for maintenance. Suspected hazardous wastes will be analyzed to determine disposal options Disposal of sediment, debris, trash and hazardous waste will be contracted out in accordance with local, county, state and federal waste control programs.

Table 3 Maintenance Program for Underground Detention Basin.	
Inspection Frequency/Indications:	First Year ❑ Before wet season begins (October); ❑ After rainfall events greater than 0.5 inches; ❑ After wet season (May). Subsequent Years ❑ Before wet season begins (October)
Maintenance Indications	**Maintenance Activities**
❑ Presence of trash and debris	❑ Remove trash and debris
❑ Damage to inlet, outlet, or other structure	❑ Repair inlet, outlet, or other structures
❑ Standing water in facility	❑ Remove standing water and/or sediment with vactor truck, as recommended by manufacturer
❑ Other indicators, as recommended by manufacturer	❑ As recommended by manufacturer

VORTEX SEPARATORS:

The operational maintenance needs of the vortex separators used on the project site are:

- Routine inspection and maintenance when necessary to ensure optimum performance.
- Periodic removal of silt, clay or other sediments accumulated.
- The time period of removal of accumulated material depends more heavily on site activities like unstable soils or heavy winter sanding but usually it is done annually.

Inspection Frequency

- Quarterly inspections will help insure the system is cleaned out at the appropriate time.
- After every large storm (after every storm monitored or those storms with more than 0.50 inch of precipitation).
- On a monthly basis during winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas.

Preventative Maintenance

- **Inspection:** Inspection of the installed vortex separator consists of determining the sediment depth of three feet in the treatment sump. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface.
- **Maintenance:** Maintenance is easiest when there is no flow entering the system. So, it is preferable to schedule the cleanout during dry weather. The most effective method of excavating pollutants from the vortex separators is to use a vacuum truck since there are no internal components that block access or view of captured pollutants. The debris shall be disposed of properly.

- **Service:** Service consists of the aforementioned inspection and maintenance procedures plus to check if manhole covers are securely seated to ensure that surface runoff does not leak into the unit from above. Any spills near the installation should be cleaned immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. Visual inspection for any leaks or damaged equipment.

Corrective Maintenance
If it is determined, based on site conditions or the condition of the vortex separator, that the inspection and/or service interval is infrequent enough for proper operation, the inspection and/or service schedule shall be reevaluated and a revised schedule shall be implemented.

Table 4 Maintenance Program for Vortex Separator(s).	
Inspection Frequency/Indications:	First Year ❑ Before wet season begins (October); ❑ After rainfall events greater than 0.5 inches; ❑ After wet season (May). Subsequent Years ❑ Before wet season begins (October)
Maintenance Indications	**Maintenance Activities**
❑ Trash and debris interfering with function of vortex	❑ Remove trash and debris
❑ Broken or damaged parts	❑ Repair damaged parts
❑ Sediment clogging	❑ Remove sediment
❑ Insert adsorbent material at capacity	❑ Replace adsorbent material when it has reached capacity or at an intervals recommended by manufacturer

LANDSCAPING:

The operational maintenance needs of the landscaping on the project site are:
- Routine inspection of landscaping and irrigation system to ensure proper growth, good coverage and to reduce, to the maximum extent practicable, the potential for siltation.
- Routine maintenance of landscaping.

Inspection Frequency:
- Inspection of the landscape and irrigation system shall take place once every 4 months. If it is determined, based on site conditions or the condition of the landscaping or irrigation system, that the inspection interval is infrequent enough for proper operation as a BMP, the inspection schedule shall be reevaluated and a revised schedule shall be implemented.

Preventative Maintenance:

- **Inspection:** Inspection of the landscaping and irrigation shall include a visual inspection of the general condition of the plants and irrigation-operating interval.
- **Service:** Maintenance of the landscaping shall take place once a month and shall include any necessary trimming of plants, and proper disposal of trimmings. Any dying plants shall be removed and replaced with an appropriate equal, to ensure the proper operation as a BMP.

Corrective Maintenance

- If it is determined, based on site conditions or the condition of the landscaping or irrigation system, that the maintenance interval is infrequent enough for proper operation as a BMP, the maintenance schedule shall be reevaluated and a revised schedule shall be implemented.
- Any dying plants shall be removed and replaced with an appropriate equal, to ensure the proper operation as a BMP.
- Faulty operation of irrigation appurtenances resulting in a condition detrimental to the water quality environment shall be corrected as soon as is practical.

All vegetated areas are to be maintained and irrigated in a manner that promotes plant health and good coverage. In the event that erosion becomes evident, the maintenance activity shall include stabilization of the area, a reevaluation of the design and the formulation of a solution for the proper performance of the BMP.

Maintenance activities to be performed in addition to the BMP maintenance listed above shall include:

Trash – Trash shall not be allowed to accumulate in a manner that allows for its transport off-site or to the storm drain system. In the event that trash or debris is generated as a result of site activity, the trash and debris shall be disposed of in the proper manner.

Sweeping – All driveway and parking lot surfaces shall be kept clean by periodic sweeping. The frequency of sweeping shall be sufficient to prevent the accumulation of silt, trash, debris and motor vehicle fluids. The frequency of sweeping shall not be less than twice yearly.

Landscape Maintenance – The use of fertilizers, herbicides and pesticides shall be done in accordance with all applicable federal, state and local regulations as well as the manufacturer specifications. Landscape waste shall be disposed of by use of a solid waste container and shall be transported off-site to the appropriate facility.

Irrigation – Landscape irrigation run-off shall not be allowed. Irrigation controllers shall be regulated in a manner that does not allow for significant landscape irrigation water run-off.

APPENDIX G

CERTIFICATION SHEET

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Edwin Reese, P.E.
Project Manager

10-03-07
Date